APPENDIX D

STATISTICAL ANALYSIS

A. Statistical Methodologies:

The Performance Assurance Plan uses statistical methodologies as one means to determine if "parity" exists, or if the wholesale service performance for CLECs is equivalent to the performance for Verizon-MA. For performance measures where "parity" is the standard and sufficient sample size exists, Verizon-MA will use the "modified Z statistic" proposed by a number of CLECs who are members of the Local Competitors User Group ("LCUG"). A Z or t score of below -1.645 provides a 95% confidence level that the variables are different, or that they come from different processes. The specific formulas are as follows:

Measured Variables:	Counted Variables: [1]
$$t = \dfrac{\overline{X}_{CLEC} - \overline{X}_{BA}}{\sqrt{s_{BA}^2 \left(\dfrac{1}{n_{CLEC}} + \dfrac{1}{n_{BA}}\right)}}$$	$$Z = \dfrac{P_{CLEC} - P_{BA}}{\sqrt{P_{BA}(1 - P_{BA})\left(\dfrac{1}{n_{CLEC}} + \dfrac{1}{n_{BA}}\right)}}$$

Definitions:

Measured Variables are metrics of means or averages, such as mean time to repair, or average interval.

Counted Variables are metrics of proportions, such as percent measures.

$\overline{X}$ is defined as the average performance or mean of the sample.

S is defined as the standard deviation.

n is defined as the sample size.

p is defined as the proportion, for percentages 90% translates to a 0.90 proportion.

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[1] For metrics where higher numbers indicate better performance, this equation is reversed. These include: % Completed w/in 5 days – (1-5 lines – No Dispatch and % Completed w/in 5 days (1-5 lines – Dispatch)

B. **Sample Size Requirements:**

The standard Z or t statistic will be used for measures where "parity" is the standard, unless there is insufficient sample size. For measured variables, the minimum sample size is 30. For counted variables, the result of np(1-p) must be greater than or equal to 5. When the sample size requirement is not met, Verizon-MA will do the following:

1. If the performance for the CLEC is better than Verizon-MA's performance or the sample size is less than 10, no statistical analysis is required.

2. If the performance is worse for the CLEC than Verizon-MA, Verizon-MA will use the Permutation Test.

3. If the permutation test shows an "out of parity" condition, Verizon-MA will perform a root cause analysis to determine cause. If the cause is the result of "clustering" within the data, Verizon-MA will provide documentation demonstrating that clustering caused the out of parity condition.

4. The nature of the variables used in the performance measures is such that they do not meet the requirements 100% of the time for any statistical testing including the requirement that individual data points must be independent. The primary example of such non-independence is a cable failure. If a particular CLEC has fewer than 30 troubles and all are within the same cable failure with long duration, the performance will appear out of parity due to this clustering. However, for all troubles, including Verizon-MA troubles, within that individual event, the trouble duration is identical. Another example of clustering is if a CLEC has a small number of orders in a single location, with a facility problem. If this facility problem exists for all customers served by that cable and is longer than the average facility problem, the orders are not independent and clustering

occurs. Finally, if root cause shows that the difference in performance is the result of CLEC behavior, Verizon-MA will identify such behavior and work with the respective CLEC on corrective action.

C.   Verizon Exceptions Process:

1.   A key frailty of using statistics to evaluate parity is that a key assumption about the data, necessary to use statistics, is faulty. As noted, one such assumption is that the data is independent. Events included in the performance measures of provisioning and maintenance of telecommunication services are not independent. The lack of independence is referred to as "clustering" of data. Clustering occurs when individual items (orders, troubles, *etc.*) are clustered together as one single event. This being the case, Verizon-MA will have the right to file an exception to the performance scores in the Performance Assurance Plan if the following events occur:

    a.   **Event Driven Clustering: Cable Failure:** If a significant proportion (more than 30%) of a CLEC's troubles are in a single cable failure, Verizon-MA may provide data demonstrating that all troubles within that failure, including Verizon-MA troubles were resolved in an equivalent manner. Verizon-MA also will provide the repair performance data with that cable failure performance excluded from the overall performance for both the CLEC and Verizon-MA. The remaining troubles will be compared according to normal statistical methodologies.

    b.   **Location Driven Clustering: Facility Problems:** If a significant proportion (more than 30%) of a CLEC's missed installation orders and resulting delay days were due to an individual location with a significant

facility problem, Verizon-MA will provide the data demonstrating that the orders were "clustered" in a single facility shortfall. Then, Verizon-MA will provide the provisioning performance with that data excluded. Additional location driven clustering may be demonstrated by disaggregating performance into smaller geographic areas.

c. **Time Driven Clustering: Single Day Events:** If significant proportion (more than 30%) of CLEC activity, provisioning or maintenance, occur on a single day within a month, and that day represents an unusual amount of activity in a single day, Verizon-MA will provide the data demonstrating that the activity is on that day. Verizon-MA will compare that single day's performance for the CLEC to Verizon-MA's own performance. Then, Verizon will provide data with that day excluded from overall performance to demonstrate "parity."

2. **Documentation:**

Verizon-MA will provide all details, ensuring protection of customer proprietary information, to the CLEC and Department. Details include, individual trouble reports, and orders with analysis of Verizon-MA and CLEC performance. For cable failures, Verizon-MA will provide appropriate documentation detailing all other troubles associated with that cable failure.

3.   Timeline for Exceptions Process:

The following is an example illustrating the timeline for the Exception Process.

Action	Date
January Performance Reports	February 25th
Verizon Files Exceptions on January Performance	March 15th
CLEC and other interested parties Files Reply to Verizon Exceptions	April 1st
Department Issues Ruling on Exceptions	April 15th
February Performance Reports	March 25th
March Performance Reports	April 25th
Credits Processed for January Performance	By May 1st